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It is proposed that mental retardation is not necessarily caused by a genetic factor or by brain injury, but may be caused by the cultural environment in which children are raised. When children are left in psycho-socially deprived homes, their rate of development will tend to decline. If, at an early age, they are placed in a school for a few hours each day, their rate of development will tend to increase or at least to hold constant.

Home training and home and school environments are important factors in child development. When children are admitted to school, they tend to widen their horizon of experience. Their intellectual development accelerates. Evidence is presented to show the effects of schooling on intellectual development. Children studied were from state institutions, underprivileged homes, or communities where children were not trained at the pre-school level.

One experiment involved a set of 5 year old twins, identified as the Alpha Twins, one left-handed and one right-handed. The left-handed child had a slight speech defect and an I.Q. of about 75. The right-handed child seemed to be the leader. He had no speech defect and an I.Q. of 86. The left-handed child was placed in a pre-school. At the age of six, both were re-tested. The left-handed twin's I.Q. rose to 86; she now appeared to be the leader. Her twin experienced a drop in I.Q. to 78.

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# THE "IQ" AND POTENTIAL

Dr. Samuel A. Kirk

Talk delivered to the
Great Cities School
Improvement Workshop,
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(Transcription of a tape)

Detroit Public Schools

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# THE "IQ" AND POTENTIAL

I was a little bit concerned about what I should talk about today --whether I should talk about remedial reading methods or about some of the problems we have faced in research and the results which we have obtained. I have decided to give you the results of two pieces of research that I think will throw some light on the problem of why children do not develop and, maybe, some of the things we might have to do in our society to help, especially, underprivileged children to develop a little better than we have in the past.

It has been interesting to me that many years ago Alfred Binet, who was the inventor of the individual intelligence test, did not himself believe that the IQ was constant. Most of us feel that Alfred Binet started intelligence testing and that was his major contribution; but if we look into the books which he wrote, several of which have never been translated into English, we find that in 1909 he wrote a book entitled Modern Ideas About Children. In one of his chapters he stated: "Now that we can measure intelligence and find defects in intelligence, what are we going to do to correct or to cure it." Then Alfred Binet proceeded to organize some classes, classes that he said would improve intelligence; and he ununciated his philosophy about it and some of his practices. In this country we immediately took over Alfred Binet's idea of the IQ and the Intelligence Test, and we forgot about his ideas that maybe children can be improved and that what they are today need not mean that they shall remain that way. I think that one of the reasons we forgot about Binet's original idea is because of some research and some ideas that originated in this country at about that time.

I think the first one was the study of heredity, especially by Henry Goddard. Henry Goddard set out to prove from 1910 to 1918 that intelligence, mental deficiency, delinquency and crime were inherited. All of you know about the study of the Jukes and the Kalikaks. The idea prevailed in this country for many years that if children do not learn in school; if they are delinquent; and, if they are mentally defective, that it is the result of a genetic factor which cannot be altered by environment, schooling, or training.

We spend a great deal of time in this country attempting to control rather than educate some of these people. Note for example the great emphasis on sterilization in this country in the twenties. We thought in order to prevent the propagation of individuals who are causing us trouble in schools and in communities, that the thing to do is to sterilize them and therby prevent delinquency and mental deficiencies and all of the problems which we have in schools. Unfortunately, the efforts in sterilization did not get too far, and where they did do extensive sterilization, especially in California, we did not notice too much decrease in mental retardation.

A second concept that originated in this country that seemed to retard our efforts in developing children was the concept of "pseudo-feeblemindedness". They said to us now, "It is inherited", and children that are low academically and intellectually inherit that deficiency. Then when we said look at Johnny, he tested low and now he

has changed--they said that is pseudo-feeblemindedness because the original diagnosis must have been wrong; and, since the IQ cannot change, the original diagnosis was wrong and the last one was correct. So we tended to shove aside a lot of the changes we saw in children by labeling them pseudo-feebleminded.

Then we had definitions which told us that retardation is incurable. It existed at birth, obtained at maturity and was of constitutional origin. Now, interestingly enough, these are the ideas that have prevailed for many years in this country that have resulted in the neglect of many children. I have been very interested in the people in animal genetics, those that have been working on cows and milk production, and fat and butter fat, because they do not seem to think that way. They tell us that they can improve butter fat in cows by in-breeding if they take about eight generations of cows, but they do not do that because they can get the same results through nurture in one generation. In other words, the people in animals genetics are more environmentalists than they are hereditarians--more so than we are with children.

Now this morning I would like to present to you two pieces of research that bear upon this problem of: (1) can children change by training in schooling--what are the environmental effects that produce retardation? (2) what seem to be some factors in the nature of children themselves that we have to look into to produce changes?

I would like to present to you two pieces of research this morning, one of which I have published, and the other one not yet published. The first one deals with the effects of schooling on mental retardation, especially at an early age. The other one deals with new methods of evaluating children that may lead to some form of remediation. In this experiment, I worked with 81 children under the age of six in different settings (some of whom were trained and some of whom were not), and just so that we can communicate, let me say, I tried to divide these children into six categories. The first one I called <u>uneducable</u>. I do not know if that is a good term but that is the group that I did not include. They had psychometric ratings below 45 on at least two intelligence tests. We studied their behavior, their language development, their social maturity; and if three of us rated them as uneducable, we did not take them in the experiment.

The next group I called <u>questionable educability</u>. They rated between 45 and 54 IQ plus the other information which we had. The next categories were <u>low educable</u>, <u>high educable</u>, <u>border line</u>, <u>low average</u>, and <u>average</u>. Now these are the categories I use in classification. I gave them numbers 0, 1, 2, 3, 4, 5, and 6. My criteria of improvement was that if a child started out as high educable and dropped to low educable he went down a minus one. If he went up one level, he went up a plus one, or if he went up a second level, he went up a plus two. I considered any change here a significant change.

We would expect a child who starts out as educable would follow a regular path; even though he might jump up and down as he grows older, he would remain the same. Theoretically, children are supposed to grow at the rate at which they start; e.g., if they start average, they remain average; if they are low average, border line, or high

educable, they remain the same; and the question is, can some of these children go up or down as they grow older.

One of the experiments consisted of children from underprivileged homes. We found in the community eight families that I considered quite inadequate. These families, I think, are found in all communities. A father may be normal in intelligence; a mother, relatively average in intelligence, having seven children of whom are mentally retarded without any physical disability. The father, although of average intelligence, never learned to read and was unable to hold a job. This family was on relief most of the time. The mother was twenty-seven years old and already had seven children. They lived, all nine of them, in a trailer. In spite of the efforts of social agencies and of others to help them, nothing seemed to work to get the man to hold a job for any length of time to support his family.

Other families were of similar nature. One woman was reported to have had thirteen children, three husbands (married or unmarried), supposedly recommended for an institution for the mentally retarded. She never got there and as a result finally had thirteen children around the community. I can name and give you the history of these eight, what I call, inadequate families. They had, at the time of this experiment, twenty-six children under the age of six. So we sent a taxi to these trailers, shacks, and garages, brought these young children to school at the age of 3, 4, and 5 and kept them in school until 4 o'clock and sent them back. The other fourteen children, sibling and twin controls, we left at home. All of those that had training at the pre-school level, and those who had no training at the pre-school level, of course, were admitted to the regular schools at the age of six. So this in itself is a small part of the experiment with a controlled group, so to speak. I tried to get twins, retarded twins, but only succeeded in getting two, so I took the children that were a year or two older or younger; that is, we took one child and left the other at home.

The first ones I shall mention I call the Alpha Twins. Semi-adequate was my classification in terms of their cultural level. The father was on relief part of the time; he was an unskilled laborer. The mother was very religious. They had five children, three of whom were already in the public school, all three being not so much mentally retarded as educationally retarded. They all failed the first grade, were then promoted into the second grade but were all retarded a year or two. The social worker suggested to us that we look into that family since they had a set of five-year-old twins. When we went to the home, we found these twins at home with the mother. The mother had signs all over the house. They said, God does not believe in swearing; God does not believe in smoking; God does not believe in disobedience; as a matter of fact, in that particular home it seemed that God did not believe in anything. A very strict mother, very constricted, she made the children toe the mark with this particular religious tinge.

We tested these two children. One of them was lef-handed, the other one was right-handed. The one that was left-handed had a slight speech defect. Her IQ was in the high 70's, 78 on one test and 76 on another. The right-handed child had an IQ of about 86. She was the

leader, she did not have the speech defect and her IQ was higher. So, we did the mean thing of taking the lower one, the 78 IQ, left-handed, speech defective one, into the pre-school and left the other one with her mother.

At the age of six we retested both of them. We found that the one we had taken into the pre-school now seemed to be the leader. Her IQ went up to about 86. The other one dropped at the age of six to about 78. As a matter of fact, they seemed to reverse themselves in one year.

The initial test for one of them was at level 4, the border line, and the other one started out at level 5, low average. At the age of six, the one that was 4-border line, jumped to low average; and the one that we did not take, the control, dropped from low average to border line. At the age of six, both of these children were sent to the first grade, one in one first grade and the other one in another first grade, since the school system did not like to put twins in the same first grade. At the end of the first grade level, the one that we had in the pre-school jumped to level 6. She became average in intelligence, passed the first grade test on reading, sociometrics and others as an average child. The other child, after being in first grade for one year, jumped from level 4 to level 5. She went back up a little bit as a result of first-grade experience.

At the age of ten, we examined these children again (we examine them every year). We have for the child who went to pre-school, level 6. She had gone up two levels from the beginning. (Level 6 is average.) The other one who started at 5, went down to 4, went up to 5 and stayed up there. On reading tests, the one who was left-handed and speech-defective, at the age of 9, was testing 4.8 on reading tests and arithmetic tests, and on the sociometric tests and behavior rating scales she tested average. The other one consistantly stayed at 5. Of course we cannot prove anything with one case, but I wish I had twenty cases like that to indicate the effects of getting a child out of the home and giving him some schooling at an early age.

Now we had four children from inadequate homes that were taken out of the inadequate homes and placed in foster homes at the age of about 4-1/2 and placed in our pre-school. We asked the question, will these children change their rate of development? We found that all four children increased their rate of development. Every single one jumped from one to three levels. Two of them were average when we got through. Two of them, who were average, jumped one level. In other words, we had 100 per cent success by taking them out of inadequate homes and placing them in foster homes, which were not very good but much better than their own homes, and placing them in the pre-school.

Of the twelve other children I was talking about, eight of them changed their rate of development upwards, went up two to three levels. Three of them held their own rate of development. One dropped in rate of development. The one that dropped in rate of development, according to our records, attended the pre-school only 50 per cent of the time. In spite of our sending a taxi to the home, the mother was unable to have the child ready when the taxi came. Although we carried her in the experiment, we found that she dropped one level.

Two-thirds went up, one-fourth remained the same and one out of twelve dropped in rate of development.

Now, what was the growth of the fourteen children that remained home during the pre-school level but went to school after the age of six? Only two of the fourteen went up in rate of development. Seven held their own channel of development, and five dropped in rate of development or became more mentally retarded as they became older.

I present this information to you because even statistically these show a significant level of .02 and the case histories of these children indicate quite clearly what I think seems to be happening. It looks here that many children that Paul Voelker has in special classes were probably genetically normal in intelligence but because of their low environment, their poor home training, and lack of attention by society wind up at the age of six and seven with IQ's of 60-70-75 and are labeled mentally retarded, which they are at that point.

I am proposing that retardation is caused not necessarily by a genetic factor or by brain injury or by anything of that sort, but by the cultural environment in which they are raised. You can see that this statement of mine, dogmatically stated as I have, with this little data plus other data which I can present to you from other studies, may indicate that we have a cultural factor in mental retardation; and, that many children who are considered retarded were made that way by the environment in which they were raised. I would like any of you to argue with me about this data because I have checked and rechecked it and I think I have leaned over backward in the books that I have published on it. I was extremely conservative because I know it is a controversial subject and I think this, in a sense, demonstrates two things: (1) when you do not do anything for children and you leave them in psycho-socially deprived homes, these children will tend to hold their rate of development or drop their rate of development. (2) if you do something at an early age for them, get them out of their parents' hair for a few hours a day in school, you will tend to either increase their rate of development or at least hold them with very few drops in rate. If you change the environment more drastically by taking them out of the home and placing them in foster homes and giving them the opportunity of a pre-school, you will tend to get many more who change in rate of development.

Now that is one piece of evidence I would like to present to you for this project. Though you may not be dealing with pre-school children, I think the home training, the environment is a very important factor in the development of children; and when I say environment, I include school as well as home.

After obtaining the results on the culturally, psycho-socially deprived children that I discussed earlier, I went to one of our state institutions for mental defectives and I found children that were in the wards at the age of three, four, or five that seemed to have some potentiality for development. So we took fifteen children and organized a pre-school from 8:30 a.m. to 4:00 p.m., as I don't believe in small pieces of aspirin. We brought them from the wards and we set them up in this lush pre-school, we thought, with two teachers for 9 or 10 children at a time, to see if we could change

these children. All of them had been committed by the courts, certified by physicians, as feeble-minded.

We left twelve children in the wards without doing anything about training. At the age of six or six and a half, they all went to the institution school, usually two hours in the morning or two hours in the afternoon. We found that the children who are trained, taken out of the wards and given educational opportunities at the lower age level, tend to accelerate their rate of mental development according to tests. Children who remain in the wards without this training tend to drop in rate of development as they grow older.

These children were tested with the Kuhlmann and the Vineland Social Maturity Test as well as the Binet; and no matter which test was used we obtained the same results for these institution children. Those that were trained went up in rate of development; those who were not trained dropped in rate of development. None of them seemed to follow the theoretical curve of development. I think this is fairly good evidence that training of children can change their rate of development.

Now you might say that what you did was train them on the test and they are testing higher, and the others were not trained on the test, so they tested lower. But I think we have other evidence. For example, out of these fifteen children that were trained, within a period of four years, seven were paroled from the institution. One was returned to the institution, leaving a residue of six; six out of fifteen were paroled. They were paroled in 1953; and up to today, not a single one of those six has returned to the institution. Out of the twelve that were not trained, not a single one was paroled. So that is another measure of the effects of education. We had nothing to do with the rate of parole. Two of the 25 children turned out to be normal eventually, and today they are still normal. One of them is thirteen years old in the eighth grade. He has been adopted, and the other is the same in that he is in school making average progress. The others are border line, dull normal, but they are getting along in the community.

Let me now present another research project. We have two groups which were studied. One group consisted of 28 children in the community that were trained versus 26 children in the community that were not trained at the pre-school level. All of these children went to school at the age of six (that is, the regular school) and this is the rather interesting result. First of all, we obtained a theoretical curve for these 54 children. According to the Kuhlmann-Binet, the Stanford-Binet, or the Vineland Social Maturity, they were supposed to grow at a particular level. The children that were trained tended to begin to accelerate (I think the average age at admittance was four) their rate of development immediately and continued that acceleration even after entering school at the age of six. At the age of six it began to taper off but there was no drop; I think there was an increase of a few points in the IQ after the age of six.

Then we went into communities and we tested 26 children, not from inadequate homes, not from the homes I described earlier. These were homes of just average individuals of lower socio-economic status.

Some of the parents were inadequate but most of them were adequate. The children in those homes tended to follow the theoretical curve from the age of 4.4 to the age of 6. They grew at the rate they were supposed to grow while they remained at home. Then they entered the first grade. A year later when we tested them we found that the first grade did something for them. It began to accelerate their rate of development. I concluded, rightly or wrongly, that if children come from very psycho-socially deprived homes and they are admitted into the first grade, then the school at that point is unable to combat the influence of the home and change the rate of development of children at the age of six. We have to start younger provided the homes are very bad. However, if the homes are relatively adequate, I do not mean high socio-economic level, (I mean just ordinary poor Americans with average education; not too high not too low, but ordinary homes) then the children may tend to be depressed in those ordinary homes; but when they enter the first grade, schooling does something for them and it is showing up, not only in this study, but in three other studies of which I have knowledge. As soon as these children are admitted into school, they widen their horizon of experience in school and after school to a point where it does something for their intellectual development. That is something that we have not talked about. We have talked about their development in reading and that sort of thing. We find that if children come from relatively adequate homes they may be depressed at the pre-school level, and it does not make too much difference whether you start their training at four, five, or six, then schooling does something for these children and begins to increase their rate of development. In other words, the age of six for this group is not too late to change provided you have some cooperation from the homes. If you have the homes that I have talked about in the previous experiment, then it seems to be very difficult to combat that kind of environment. If I go back to the institution group, it only shows that slightly, but the institution children who remained in the wards dropped for two or three years. Every year we tested them they were lower sitting in those wards. When they allowed them to go to the institution school two hours a day, they stopped dropping. They did not go up any more, they stayed low, but they did not drop any more even in institution school for two hours. If you give them education, of course, you increase their rate of development. Those are just some factors indicating the influence of environment and schooling on the rates of development of children.

This is just another angle. I talked about the nurture of the environment. We also have to talk about the nature of the child, and later on I will tell you some more about the nature of children and how we have to diagnose factors within children.

Referring again to the fifteen children who were trained in an institution. Eight of them were children who had been committed to the institution but the doctors could not find anything organically wrong with them. I classified them as non-organic cultural-familial. The institution said they thought they were genetic but they did not have cerebral palsy, hydrocephalus, mongolism, or what have you. The doctors could not make a definitive diagnosis of organic deficiency. Of these eight, they changed their level as follows: +1, $\pm$0, +3, +2, +2, +2, +1, $\pm$0. Out of these eight, five of them were paroled.

The other seven children all had a diagnosis of organicity; they had something wrong with them causing their mental deficiency and I want you to notice the difference. Only one of the organic children was paroled. There is a difference between a child who is culturally deficient and a child who is organically deficient. In other words, pre-school training does less for children with organic deficiencies than it does for children with culturally deprived deficiencies. I think that is fairly obvious but this shows it. In a community of 28 children, half of them were organic and we got less results from the organic than we did the non-organic group. Naturally, if the child is depressed intellectually and academically because of cultural factors, then schooling should be a compensation for these cultural factors and should, in a sense, accelerate it more than if the cause were an organic factor.

I do not want to bore you with too much of this data on the effects of schooling on intellectual development. I would like to spend just a few minutes describing another kind of experiment.

When we were working with these organic children, I found a few children that I thought I could diagnose as having a specific disability. I will give you an example that is not very common but I think it will illustrate what I mean.

Here is a child that was tested at the Psychological Clinic with an IQ of 50-51 at the age of three. She was the result of maternal rubela. She had cataracts and the ophthalmologist said she was blind and should go to a school for the blind. They recommended to the parents that this child be sent to an institution. Naturally parents do not follow the recommendations of physicians and psychologists so readily, should I say fortunately or unfortunately. They kept her at home. I think it was at the age of 2-1/2 that the first diagnosis was made, and at the age of four they asked the pediatrician and the psychologist what to do. They examined the child again and said your child's eyes are affected as a result of German measles that you had during the first five months of pregnancy and that caused visual difficulty which the ophthalmologist said was blindness and that caused mental deficiency and the IQ is around 50. There is nothing we can do with this child. The best thing you can do is take her to an institution. The parents accepted the recommendation. They went over to the institution and obtained acceptance, but they said we have a waiting list and it will take about a year and a half or two years to get this child admitted into our institution.

Just about this time we were starting this experiment. They came back to the pediatrician and the pediatrician called me up. He said that maybe this child is too low for you but you might take a look at her. So we looked her over and decided to admit her. (She is one of the 28 children that I talked about earlier.) When we diagnosed her psychologically and otherwise, we found that her IQ was 50-60. We found that her verbal abilities seemed to be better than that level of a child, so we figured that she was higher but did not test higher. Then we noticed she saw a lot of things. She had nystagmus; her eyes were jumping this way and that and if we showed her something she could tell us what it was if we waited long enough. So we put this child on a tachistoscope and I said I want to train her speed of perception by specific exercise.

We did that for six solid months and by that time she was able to look at books, see pictures, and describe great details. We were very proud of our results with this specific training of the speed of perception. We called the mother in to take her back to the doctor and have him examine her eyes. He had labeled her as blind. We took the child to this young ophthalmologist and said here is your diagnosis but I would like to ask you some questions. Here is a book, Sharon, will you tell the doctor what you see. She told him all kinds of details, picture after picture. I asked her to describe the buttons on his lapel and everything else, their color and everything. He was flabbergasted. He said of course our machines do not work too well with younger children. Of course she is not blind if she can do all of that. So that encouraged me to say that maybe if we can find the specific disabilities they can learn.

I look at the medical profession and I find when you go to a doctor and he gives you sugar and water he does not know what it is all about, but when he can pinpoint it and say this is the defect and this is the prescription, then, he gets some place. The better he can diagnose, the better he can treat. One of the great difficulties in education is our inability to diagnose. We cannot do the same thing with all children because they differ so greatly. So for five years we have been playing around with a new kind of test for children, young children ages two to nine. We are not through with this test yet and I do not know what we can do with it, but at least it is a little different approach than the way we have been testing children before at a psychological level. If you have a little time, I would like to explain how we arrived at these factors and what we try to do.

How do these things develop? I became concerned about testing these children and especially the language disabilities, because one of the biggest factors in intelligence is language. How do we get at language? When I tried to test their language, all I had was the Van Alstyne and the Ammons Test. Is that a language test? It says, look at one of these four pictures; one of them is a dog, point to dog, so the child points. This is a picture discrimination test! The Ammons Test is the same and that is about all we can do in the measurement of language in children below the age of six or seven. We tried all kinds of things and then I found out that the flaw in my experiments was that I did not have good enough measures for little pieces of things, and secondly, we could not detect, especially in these organically deficient children, the real psychological disability. We did this on this youngster with maternal rubela. Her eyes were jumping this way and that all the time and it took her a long time to find something. Yet, by training we increased her speed of perception so all she had to do was flip once and see what was there instead of ten times. We could train that. We were not training her eyes. We did not do anything for her eyes. I think we did something in the speed of perception, which is a cortical activity.

So I shook my brains and I could not find out exactly what to do. We tried one thing and then another, and another, etc., and then I heard about a professor of psychology by the name of Charlie Osgood, who was giving a course called Experimental Psychology of Communication. So, being a perennial student, I went and signed up for the course, even at my age, and I listened to this fellow explain his

theory of communication. He was speculating. He was trying to figure out how people communicated, mostly at the adult level. He had worked a great deal with linguists. He is an experimental psychologist and they call it Psycho-Linguistics, and the terminology he used is out of this world. After I got through and did not understand it, I sent a graduate student and said you take that first course in Experimental Learning and this one and let us see if we cannot put some of these pieces together and work out a test. Then I sent another student and finally after working for some years, we revolved into what we call a hypothetical construct or a model on which we could develop a test and do treatment.

We developed what we call a model of the communication process. We decided that the otologists measures the ear, the peripheral sense organ, and he tells us whether a child has perceptual deafness, nerve deafness, or peripheral deafness. The otolaryngologist measures the response end, the vocal chords, and can tell us whether there is something wrong with the larynx and the pharynx; and the orthopedist can tell us if there is something wrong with the motor response. What we don't know about is what happens after it gets into the ear and what happens before it comes out of the mouth, or what goes on in the black box in the head.

After working for a great number of years with staffs of ten or fifteen people trying out, testing kids, finding out that it is no good and then trying out something else and testing, we have finally evolved something we think is at least a start. We said there are many channels of communication, but we are working with the visual and the auditory channels; that is, communication comes in through the eye, and it comes in through the ear. At the response end we have vocal and motor. I am responding vocally right now and you are receiving it auditorally. That is how we are communicating, but I can also communicate with you through gestures, partly with facial expressions or hand movements. So in our model we have two channels, auditory vocal and visual motor. We said that we have two levels. We call these the automatic sequential level and the representational level. There is also a projection level here. Let me explain it in different terms. When a child learns to talk, he babbles. Babble is not exactly instinctive but it comes out through internal proprioceptive stimulation. He babbles, and while he is babbling he says Da, Da, Da, and the "old man goes crazy", you know, and he says he's calling me Da, Da, and pretty soon the child imitates, but it has no meaning. It is an automatic sequential response going from the projection level to the sequential level. A lot of the things a child says when he repeats what the parents say has no meaning, he is just repeating what he hears. Then when he attaches meaning to this object called Da, Da, it becomes the representational or meaning level. So we have babbling, imitation, and meaning.

This level is a little different from imitation. Some people call it the integration level. The nervous system has an upper level and a lower level also, so this corresponds with the levels of the nervous system. We have developed six tests for the representational level and three for the automatic sequential level. Let me explain them just a little bit.

One we call auditory decoding at the representational level. That means that when it goes in, if the child has a disability in auditory decoding; i.e., the interpretation of something that is heard, the meaning of it, then he has a deficiency in auditory decoding. The speech pathologist may call in sensory aphasia in its extreme form. We also have visual decoding in the same way.

We think we have tests to measure those two, so we can tell whether the decoding or the meaning process is not dulled completely. We think we can tell whether it is just auditory or visual, for even though the child can hear, he may not understand and even though he can see, he may not be able to interpret. This you might consider to have some relationship to alexia.

We also have a test we call auditory-vocal-association at the representational level. This is a test like analogies or what belongs with something else. Giving it auditorily with the child responding vocally, is one test; and another is where we test at the visual motor level without hearing or saying.

Then the next one we call encoding-vocal encoding. A child is unable to talk and he has a deficiency in vocal encoding. The speech pathologist may call that expressive aphasia. This is receptive aphasia or motor encoding or the interpretation through signs of what you have. This may be similar to apraxia. At this level we have a sort of a grammar test, because grammar is automatic. We just learn grammar without logic. We just hear it and we get it. If you try and study a foreign language, you have to hear words over and over again in order to get them and that becomes an automatic process not necessarily a meaning process.

Then we have sequential ability to remember. The ability to remember a sequential thing auditorily and visually. All I am trying to say here is that we started out intuitively on the basis of theory, mostly learning theory, on how the communication process works, and then we tried to construct pure tests for each one of these.

Let me give you a few specific examples. We had a child with a chronological age of seven. We sent her to a psychological clinic and they found an IQ of about 56-58. They said the child is mentally retarded and referred her to a class for educable mentally retarded. This test that we have is in a sense a psycho-linguistic-language test. It involves a little more than language, it also is an intellectual test of a sort, and we try to say what parts of the intellectual language function are deficient and what parts are normal. With a child that has an IQ of 56, we should get a graph that should fluctuate a little bit, but there should be an even line. Here we find a child who on one test, like the progressive matrices, has an IQ of 112. That is the trouble, you know, if you are too conscientious a psychologist. Instead of giving one test and getting an IQ of 56, making a diagnosis, giving a recommendation, and placing the child you make too big an analysis and get an IQ of 112 and it throws you in a state of frustration. You do not know if the kid is mentally retarded or normal, you see. Now, if you get a thing like this, you get even more frustrated because on auditory vocal association this child was like her mental age; but on visual motor association, the same process, she was up to her chronological age. On motor encoding, on visual

decoding and on visual association, she was relatively normal. Her basic deficiency was in vocal encoding. She could not talk, and she had a special deficit in the auditory vocal automatic level.

I think I can work out instructional remedial methods for these areas of deficiencies. My ambition, which I have not yet fulfilled, is to be able to diagnosis a child, pinpoint the deficiencies, and write the educational prescription. When we can do that, then we have really reached a science of pedagogy from a remedial angle. Anyway, you have to have an ambition to keep on going on these things and that is my ambition.

This child could not talk so she went to a speech correctionist. When I went over to see what the speech correctionist was doing, she was giving her the book. She was doing a little visual motor association, a little bit of this, a little bit of this, a little bit of this--you know, cafeteria style remedial speech or remedial reading. You do not know exactly why you are giving them a little bit of each but you think, if maybe one of them hit, it might work. By trial and error you may hit on one that may work, but you are wasting time because it is better if you can hit the deficit right on the head. If you can pinpoint the deficit, whether it is remedial reading, remedial arithmetic, or remedial language, I think we will get better results. It is in these vocal encoding and automatic deficiency areas that I think we can work out exercises for this child that will produce better results. That is why we cannot do mass education with some of these kids. It just does not work. So you say, "Is phonics good or isn't it good?" Well, it is good for some and it is not good for another. You just don't have any panaceas of remediation. It is an individual proposition with one child at a time and he has to have a diagnosis and a different remedial procedure outlined for that child.

So, let me take another child. This boy was diagnosed as a cretin at the age of six months by an osteopath, and they fed him thyroxin. At the age of about six or seven, the parents got him in a clinic and they analyzed his bone age as a year below normal but there were no signs of cretinism. Maybe the thyroxin worked, but at the age of eight or nine when we say him, the boy could not talk at all. So somebody gave him an intelligence test and found out that on the performance WISC his IQ was 80, so they said he was normal. Previous to that, they thought he was mentally retarded and now they give him another kind of test and they say he is normal. The people in mentally retarded work won't take him if his IQ is 80 or 85 on the WISC performance, so what will we do? So he went to the first grade at the age of eight.

There is nearly an eight-year span between one ability and another ability on one child. We talk about individual difference and by individual difference we think how Johnnie differs from Billy. That is only one concept of individual difference. The other concept of individual difference for remediation is the most important, and that is, the discrepancy of the child within himself. How does his growth pattern fluctuate? On visual decoding this boy was above his chronological age. He could interpret pictures by pointing, without vocal response, at a very high level, but on auditory decoding, he was 4-1/2 years behind in his ability to understand when it comes in the ear and

his ability to understand when it comes in the eye. He was low on association, but his basic efficiency was in the sequential level. He cannot learn to talk because he cannot repeat.

Well, we found two things. Visual decoding was high and also, visual sequencing was high. We said these two abilities are correlated with learning to read, not by the phonetic method, but by the whole method, so let us teach this boy to read. We found that we could teach him to read quite easily. If we would say to him later, Sammie, how many eyes do you have? He could answer two. Or how many noses do you have, he would say one, or how many feet do you have and he would say two. But when we would say, I have two eyes, he could not repeat that many words in sequence. However, we could write on the board, I have two eyes; I have one nose; I have two feet; I have one head and we would say to him, Sammie, how many eyes do you have. He would look at that board and find the right sentence and he would read it--I have two eyes. In other words, we had to teach him the sequence vocally by teaching him to read first, and we got some results by using his assets to work on his disabilities.

Well, I know I have talked too long, but it is your fault for getting anybody doing research. You have to be awfully enthusiastic about your research to keep on an insane kind of profession like that, you know, day in and day out and getting no results. So, when you start talking about it we, like all school teachers, you do not know when to stop. What I am trying to say in this is that in work with children we have done a tremendous amount of work on reading. We can profile reading disabilities and good diagnosticians can pinpoint, to some extent, the basic difficulties in a child that requires remediation. We need this kind of a test for a more intellectual psycholinguistic function and we need some kind of diagnosis beside the superficial ones we have now on arithmetic disabilities. We need to know just why some children cannot develop quantitative thinking concepts and I think when we have the basic ones like language, reading, and arithmetic, we are on our way to a little more of the scientific remedial pedagogy than we are today.

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